



Forest Health Protection Pacific Southwest Region



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To: District Ranger, Hat Creek Ranger District, Lassen National Forest

Subject: Potential insect concerns with respect to the Straylor Fire
(FHP Report NE05-02)

At the request of John Zarlengo, Forester, Hat Creek Ranger District, we visited the 2004 Straylor Fire on November 1, 2004 to evaluate fire injured trees that burned at different fire intensities. This field evaluation was conducted in order to provide salvage marking recommendations to the Straylor ID team as part of the development of the Straylor Fire Salvage and Restoration Project. As a follow up to the salvage marking recommendations, using the observations made on this field visit combined with experience from other recent California fires, this report will review the potential insect impacts to trees within and adjacent to the 2004 Straylor Fire.

Background Information

The Straylor Fire started on July 22, 2004 and burned 3,422 acres before it was controlled on August 2, 2004. The analysis area is approximately 6,350 acres and is located within the Blackjack Management Area in Sections 2-17 and 22-24, T34N, R8E, MDB & M (this is approximately 20 miles southeast of Fall River Mills, CA). The analysis area consists of rocky sage flats, juniper stands, eastside pine stands, seasonal wetlands and drainages, and Davis Creek. The area bounded by Forest Road 22 and the Forest boundary to the north, Straylor Lake to the south, Davis Creek drainage to the west, and Forest Road (FS road) 34N93 to the east. Forested areas consist of western juniper (*Juniperus occidentalis*), ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*Pinus jeffreyi*), incense cedar (*Libocedrus decurrens*) and white fir (*Abies concolor*).

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Discussion

Fire damaged trees can be placed into three categories: 1) those killed outright or so severely damaged by the fire that they are dead or will soon die; 2) those that are undamaged or lightly damaged and should survive, and 3) those in between, the moderately damaged trees. Bark beetle attacks that occur on trees without moist cambium (Category 1) will not be successful in producing brood. Although some attacks have been noted on trees with severe fire damage, there is no cause for concern with respect to bark beetles. Based on information from previous wildfires in California, trees not injured or lightly injured by the fire either within the area of the burn or in the surrounding forest are rarely attacked (Category 2). The potential additional mortality associated with bark beetles would come from trees in the third category. Based on post-fire stand data collected by District personnel and field observations made by Forest Health Protection personnel, most of the trees within the Straylor fire fall into either Categories 1 or 2. Very few acres within the fire burned at the intensity that would create moderately damaged trees (Category 3).

Additional tree mortality within the analysis area should be expected over the next three years. This mortality will likely occur from fire injuries alone, in the case of severely injured trees, and from a combination of fire injuries and bark beetle attacks, in the case of some moderately damaged trees. However, the potential bark beetle activity is not likely to result in a population buildup that will subsequently spread into undamaged or lightly damaged trees (Host/insect specific information is provided below). Additional mortality related to fire injuries could be expected in areas where the fire was hot enough to burn significant portions of the cambium or in areas where the residual tree crown is not sufficient to sustain the tree. In addition, particularly in fire damaged white fir, there may be green trees that develop extensive sapwood decay over the next few years that could present hazardous working conditions for field crews.

Recent monitoring of fire-injured trees has revealed the failure of 8" to 24" dbh red and white fir, with green crowns, in as little as three years. The rate of failure increased dramatically after the fourth year post-fire, especially in conjunction with high winds or heavy snows. During the 1999 Bucks Fire on the Plumas National Forest the crowns of many true firs were light to moderately scorched. However, these same trees suffered moderate to severe cambium injury and near complete girdling in some cases. Following the fire, frass and/or boring dust from wood boring and ambrosia beetles were evident on many of the tree boles, often indicative of internal injury. Bark sloughing over the last couple of years from the damaged areas of the bole and root collar has revealed extensive decay of the sapwood, however, most of these trees have maintained green crowns. During the fourth year post-fire, a few trees within the burn that had green crowns and extensive bole decay failed. In the fall of 2004, after an early storm brought heavy snow and wind, many more trees failed with these same characteristics. This has also been observed recently in a few fir trees in the 2001 Star Fire (Tahoe National Forest) and the 2000 Storrie Fire (Lassen National Forest).

Ponderosa and Jeffery pine

- Western pine beetle, *Dendroctonus brevicomis* (ponderosa pine)
- Mountain pine beetle, *Dendroctonus ponderosae* (ponderosa pine)
- Jeffrey pine beetle, *Dendroctonus jeffreyi* (Jeffrey pine)
- Red turpentine beetle, *Dendroctonus valens* (Ponderosa and Jeffrey pine)
- Pine engraver beetle, *Ips pini* (Ponderosa and Jeffrey pine)

Bark beetle attacks that occur on trees without moist cambium will not be successful in producing brood, therefore, there should be no concern regarding bark beetles building up in trees that have been killed outright by the fire. Although bark beetles may be observed successfully attacking a few light to moderately damaged trees within the Straylor Fire, based on our observations of hundreds of fire damaged ponderosa and Jeffrey pines, we do not anticipate a great buildup of pine engraver, mountain, western or Jeffrey pine beetles in the surviving trees.

Over the past three years elevated levels of red turpentine beetle activity have been noted in several areas in northeastern California. All cases have been associated with wildfires, prescribed fires or thinning activities. To date, these attacks have not caused elevated levels of mortality. In the prescribed fires and wildfires, post-fire mortality has been observed but was caused by fire-related injuries (primarily cambium kill) as opposed to red turpentine beetle attacks, with the exception of some mortality observed in small diameter pines. Based on this information, observations following other fires, and the current moist precipitation pattern, we would not anticipate any additional mortality related to the red turpentine beetle attacks.

White fir

- Fir engraver beetle, *Scolytus ventralis*

Due to the one-year life cycle of the fir engraver beetle, populations tend to build slowly over a period of several years before ever reaching epidemic proportions. This build up generally occurs over large areas that are experiencing prolonged drought stress. In addition, the fir engraver beetle does not have a strong aggregating pheromone so at low population densities it lacks the ability to mass attack isolated pockets of stressed trees. Due to the limited size of the Straylor Fire and the limited amount of host material, it is not likely that an increase in fir engraver beetle populations will occur. However, populations of fir engraver beetle have been increasing throughout the eastside and transition zones over the past several years and a few trees that have suffered fire-injuries may be attacked and killed over the next couple of years. This should not result in an observed increase in the number of trees attacked outside of the fire perimeter. Furthermore, if the current wet weather pattern continues, area wide fir engraver/drought-related mortality will likely decline.

Incense cedar

- Cedar bark beetles, *Phloeosinus* spp.

Cedar bark beetles generally attack dead and dying trees. Although, some branch and top killing may be observed in fire-injured trees, trees that were undamaged or lightly damaged should not be attacked by these beetles.

Secondary insects (all conifer species)

There are a number of species of flatheaded (family Buprestidae) and roundheaded borers (family Cerambycidae) that mine in the phloem, sapwood, and in some cases, the heartwood of dead and dying trees. Attacks initially occur within the first few years after a fire, but can continue for 4 or 5 years, as long as the wood remains sound. The damage to the sapwood and heartwood from these insects, along with fungal deterioration, can be a factor in determining the limit of economical salvage in an area.

Insects that bore into the sapwood and cause degradation also include the ambrosia or pinhole borers. The defect caused by this beetle consists of small holes surrounded by a dark stain. Galleries are constructed within the sapwood where the larvae feed on the ambrosia fungus that is introduced by the female beetle as she constructs the galleries. Ambrosia beetles should be anticipated in the fire-killed and fire-injured trees.

Conclusion

Removing the obviously dead trees will have no residual effect on bark or woodborer beetle populations in the surrounding area. The delayed removal of this material will likely result in greater defect and therefore loss of economic value from woodborers and ambrosia beetles as time passes.

With respect to the Straylor Fire, leaving trees uninjured or lightly injured by the fire within the analysis area is not going to lead to a buildup of bark beetle populations such that additional mortality would be expected from attacks alone. As mentioned above, some additional tree mortality should be expected over the next few years due to fire injuries and perhaps a negligible level of bark beetle or woodborer activity. Economic value of fire-injured trees may be reduced due to blue stain, sapwood decay and/or ambrosia beetle activity that may not be readily discernable until crowns fade or trees fail.

If you have any questions regarding this report and/or need additional information please contact the FHP entomology staff at 530-257-2151.

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